Types of Force Problems:

1. Equilibrium
   - acceleration = 0 m/s^2
   - this happens when object is at rest or moving w/a constant velocity

$$\sum F = 0$$

2. Non-equilibrium
   - acceleration $\neq 0 \text{ m/s}^2$

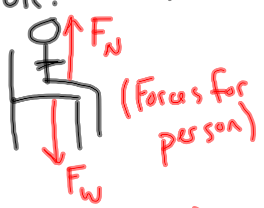
$$\sum F = ma$$

Free-Body Diagrams (FBDs):

$$\sum F_y = 0$$

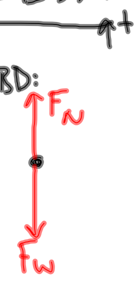
$$F_N + (-F_w) = 0$$

Picture:



[person in equilibrium]

FBD:



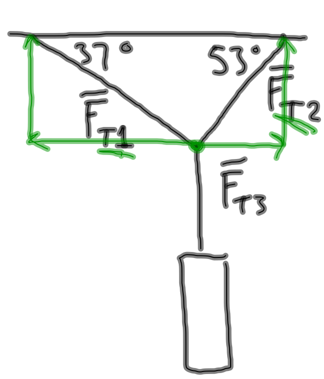
[vectors need to have relative magnitudes]

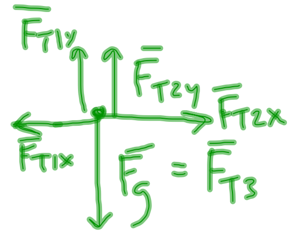
- all vectors at angles need to be broken down into x, y components
- each object analyzing need its own FBD

• Look at Problem-Solving Strategy on p. 111 in textbook

Force Notes and Practice Problems 9.8.11

A traffic light weighing 122 N hangs from a cable tied to two other cables fastened to a support as in the figure. The upper cables make angles of 37.0 degrees and 53.0 degrees with the horizontal. These upper cables are not as strong as the vertical cable and will break if the tension in them exceeds 100 N. Does the traffic light remain hanging in this situation, or will one of the cables break?





y-direction:

$$\sum F_y = 0$$

$$F_{T1y} + F_{T2y} - F_g = 0$$

$$F_{T1}\sin(37°) + F_{T2}\sin(53°) - F_g = 0$$

x-direction:

$$\sum F_x = 0$$

$$-F_{T1x} + F_{T2x} = 0$$

$$F_{T2x} = F_{T1x}$$

$$\frac{F_{T2}\cos(53°)}{\cos(37°)} = F_{T1}$$

$$\frac{F_{T2}\cos(53°)}{\cos(37°)}\sin(37°) + F_{T2}\sin(53°) - 122\,N = 0$$

$$F_{T2} = \frac{122\,N}{\left[\frac{\cos(53°)\sin(37°)}{\cos(37°)} + \sin(53°)\right]}$$

$$= 97.4\,N$$

$$F_{T1} = \frac{F_{T2}\cos(53°)}{\cos(37°)}$$

$$= 73.4\,N$$

HW: p. 124: 6

p. 126: 13

p. 128: 5, 9

p. 129: 17